Lesson C6–2

Using Power Tools and Small Landscape Maintenance Equipment

Unit C. Nursery, Landscaping, and Gardening

Problem Area 6. Using and Maintaining Tools and Equipment

Lesson 2. Using Power Tools and Small Landscape Maintenance Equipment

New Mexico Content Standard:

Pathway Strand: Power, Structural and Technical Systems

Standard: **III:** Apply principles of service and repair to mechanical equipment, structures, biological systems, land treatment, power utilization, and technology.

Benchmark: **III-G:** Use tools in the workplace to demonstrate safe use and proper skills with construction/fabrication hand tools.

Performance Standard: **1.** Demonstrate proper use of measurement and layout tools. **4.** Demonstrate hand and power tool use to construct/fabricate an actual project according to blueprints or plans. **5.** Identify and demonstrate proper hand and power tool maintenance procedures.

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Describe common turf maintenance equipment and its use.
2. Explain common landscape installation and maintenance tools and equipment.
3. Discuss the proper maintenance of power tools and equipment.

List of Resources.

The following resources may be useful in teaching this lesson:

Recommended Resources. One of the following resources should be selected to accompany the lesson:

Instructional Materials Service. *Identifying, Maintaining, and Storing Tools and Equipment Used in Horticultural Plant Production.* College Station, Texas: Texas A & M University (8929-A).

Other Resources. The following resources will be useful to students and teachers:

Schroeder, Charles B., et al. *Introduction to Horticulture*, Third Edition. Danville, Illinois: Interstate Publishers, Inc., 2000.

Phipps, Lloyd J. and Glen M. Miller. *AgriScience Mechanics*. Danville, Illinois: Interstate Publishers, Inc., 1998.

Biondo, Ronald J. and Charles B. Schroeder. *Introduction to Landscaping: Design, Construction, and Maintenance,* Second Edition. Danville, Illinois: Interstate Publishers, Inc., 2003.

Reiley, H. Edward and Carroll L. Shry, Jr. *Introductory Horticulture,* Sixth Edition. Albany, New York: Delmar Publishers, 2002.

Cooper, Elmer L. *Agricultural Mechanics: Fundamentals & Applications,* Fourth Edition. Albany, New York: Delmar Publishers, 2002.

List of Equipment, Tools, Supplies, and Facilities

Writing surface
Overhead projector
Transparencies from attached masters
Copies of student lab sheets
Horticultural power tools

Terms.

The following terms are presented in this lesson (shown in bold italics):

Aerator
Chain saws
Concrete mixer
Dethatcher
Grass edger
Leaf blower
Power hedge shears
Power pole pruner
Reel mowers
Rotary mowers

Rototiller
Shredders
Soil sterilizer
Weedeater

Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Horticultural power tools can save time and money. The quality of work can also be improved by using the correct tools. Display the various tools and ask students if they know the names of the tools and how they are used. Use the discussion to lead into the lesson.

Summary of Content and Teaching Strategies

Objective 1: Describe common turf maintenance equipment and its use.

Anticipated Problem: What are some commonly used turf maintenance equipment and how is it used?

I. Many power tools are used in the turf management industry. These power tools greatly increase the efficiency of the work. Power tools may be electric motor powered or gasoline engine powered.

A. Mowers may be push, self-propelled, or riding mowers. A quality mower is essential to quality turf management. ***Rotary mowers*** cut by using one or more blades that turn in a circle. Almost all home lawns use this type of cutting procedure at a two or three inch height. ***Reel mowers*** use a curved turning cylinder cutting against a bed knife to cut the grass. A properly sharpened reel cuts like a pair of scissors leaving a clean cut with a very smooth surface. Golf course greens, tees, and fairways are mowed with a reel mower.

B. A ***weedeater*** or trimmer is used to trim grass and weeds in areas not accessible by a mower. Weedeaters use plastic string for grass and weeds, but can also be equipped with a steel blade to cut large weeds and small trees. Small weedeaters may be electric powered but a gasoline engine is used with more powerful units.

C. A ***grass edger*** is used to trim the grass along the edges of sidewalks and driveways. The engine powers a belt-driven pulley that turns a 10-inch cutting wheel. The cutting height is adjusted at the handle.

D. A ***leaf blower*** blows leaves, grass clippings, and other debris from landscape beds, sidewalks, and driveways.

E. An ***aerator*** is a tool used to remove cores of soil in compacted areas. After aeration, sand may be top dressed over the turf to fill the holes. The soil cores with grass will decompose and work back into the turf. A small aerator can be pulled behind a riding mower.

F. A ***dethatcher*** is a machine designed to lift the thatch (dead grass and grass clippings which have not decomposed) out of the turf. The dethatcher is usually pulled behind a riding mower. Heavy fertilization of a lawn where clippings are not bagged will result in the need to dethatch. In this situation the thatch layer builds up faster than decomposition can occur.

G. Spreaders are used to distribute seed and fertilizer. Spreaders may be drop or cyclone type spreaders. Most power spreaders are the cyclone type and used mainly on large areas such as parks and golf courses.

H. Power sprayers are used to distribute pesticides in large areas such as parks and golf courses.

Go to the local golf course or park district to look at the turf maintenance equipment. Learn to identify each power tool and learn how each is used in turf management. Use the school owned equipment to mow, trim, and edge the school lawn. Use TM: C6–2A to help learn the names of the tools.

Objective 2: Explain common landscape installation and maintenance tools and equipment.

Anticipated Problem: What are the commonly used landscape power tools and how are they operated?

II. Landscape installation and maintenance is made much easier by the use of power tools. Power pruners, chainsaws, shredders, tillers, and sterilizers each help complete important tasks.

A. ***Power hedge shears*** may be electric powered or gasoline powered. A power hedge shear can be used to prune small shrubs but is most useful in pruning hedges. When using electric powered shears be sure to keep the cord away from the cutting edge. Be sure you are positioned so that you have good footing and balance during operation of the shears.

B. ***Power pole pruners*** use air pressure created by a gasoline engine to allow you to close the jaws with a minimal physical effort. The main use of the power pole pruner is in an orchard where many trees need pruning.

C. ***Chain saws*** use a rotating chain with cutting teeth to cut wood. Some small chainsaws are electric powered, but most chainsaws are powered by a 2-cycle engine that requires mixing oil with the gasoline. When cutting branches or limbs over 1 or 2 inches in diameter, a chainsaw is essential if the work is to be done in a efficient manner. Use extreme caution when operating a chainsaw. The potential for serious injury to the operator is great. Wear safety goggles, ear plugs, keep the chain tightened and sharp, maintain good balance, and hold the saw securely with both hands. Select a saw with kickback protection. Use the bottom side of the chain to cut. Never cut with the end of the chain.

D. ***Shredders*** are used to grind up branches and other plant material. The resulting wood chips can be added to compost piles or used as mulch in landscape beds. Shredders come in all sizes. Follow manufacturers recommendations for use. Throw material into the shredder. Never push the material with your hands. Branches are grabbed and pulled

into the machine. If you have your hands on the branch, they may be pulled in. Safety glasses or goggles should be worn when shredding.

E. A ***rototiller*** is useful to prepare seedbed areas for turf or landscape beds. The bigger the area, the larger the tiller should be. Small tillers are usually front tine and larger tillers are usually rear tine. Steel-toed shoes are a good idea when operating a tiller. Adjust the depth of the tiller to match the hardness of the soil. A tiller set deep on hard compacted soil or sod can pull you along as it skips along on the top of the ground. Start with a shallow setting and use two or three passes to go deeper.

F. A ***soil sterilizer*** is useful if severe disease problems have occurred in the past. Sterilizers generally use electric power to generate heat to make steam. Soil temperature must be brought to 180°F and held there for 30 minutes to effectively destroy disease organisms.

G. A ***concrete mixer*** is a rotating drum of 4 or 9 cubic feet used for mixing ingredients. It is useful not only for mixing concrete, but also helpful in mixing soil with amendments such as peat moss, dried cow manure, and commercial fertilizer.

Visit a landscaper to see these power tools. Have the landscaper discuss the use and maintenance of them. Use TM: C6–2B as a way to direct student attention toward learning how to identify these tools and become familiar with their function. LS: C6–2B can be used as a note sheet or quiz.

Objective 3: Discuss the proper maintenance of power tools and equipment.

Anticipated Problem: What maintenance practices need to be done with horticultural power tools?

III. Proper maintenance and storage of small power tools is essential for keeping equipment in good working order. Most electric powered tools are relatively maintenance-free. Bearings and gears are lubricated and sealed at the factory. Gasoline powered equipment needs to be serviced on a regular schedule. Lesson C6–4 Maintaining Small Engines is a helpful resource for engine maintenance. Operator's manuals also give detailed information.

A. A beginning point for preventative maintenance is keeping tools and equipment clean. The outside appearance of a tool is often an indication of the owner's concern or lack of concern for preventative maintenance.

B. Check every power tool before it is used for defects. Unplug electric tools while checking and repairing. Do not use tools that create a potential safety hazard such as electric tools with damaged cords or tools with missing or defective guards/shields. Do not operate electric tools in wet or damp areas. Operate gasoline-powered tools only in well-ventilated areas.

C. Tools with chains or belts need to be checked for tightness and wear. Loosen cogs when installing a new chain and pulleys before installing a new belt.

D. Store tools in a clean dry location. If the tools are always stored in the same place, time is saved trying to find them.

E. Cutting edges should be kept sharp. The results are a safer more efficient tool that does a high quality job. Use hand files or a power grinder to sharpen tools.

1. If a grinder is to be used, inspect the wheel for cracks or chips before it is used. A medium-grain wheel is used for rough grinding where a quantity of metal needs to be removed. A fine-grain wheel is used for sharpening tools that require a smooth or exact edge.
2. Always use a face shield or goggles when grinding. Protect your hands with leather gloves.
3. Hold small items with vise grips. Larger items need to be held firmly in your hands or ground with a portable grinder.
4. Do not use the side of the grinding wheel. The pressure and uneven heating can cause the wheel to crack and fly apart.
5. Be sure the tool rest is slightly above the center of the wheel and that it is adjusted to within 1/8 of an inch of the wheel. Adjust the tool rest angle to match the angle of the item being ground.
6. Keep a supply of water nearby to dip tools in to prevent overheating while grinding.

Discuss the maintenance that should be performed with turf and landscape power tools. Use LS: C6–2A to do a maintenance inspection of an available horticultural power tool. Use LS: C2–2B to have students sharpen a rotary mower blade.

Review/Summary. Use the transparencies to review the power tools useful in turf and landscape. Discuss the maintenance needed for these tools and review the use of the grinder in sharpening.

Application. The field trip to the golf course, park district, and/or a landscaper gives the students the opportunity to see the power tools in use. The lab sheets allow students to apply an understanding of maintenance procedures and the use of a grinder in sharpening a mower blade.

Evaluation. Performance with the lab sheet activities and completing the test can be used for evaluation of this lesson.

Answers to Sample Test:

Part One: Matching

1=h, 2=e, 3=b, 4=i, 5=f, 6=j, 7=g, 8=c, 9=a, 10=d

Part Two: Completion

1. self-propelled, riding
2. dethatched
3. Spreaders
4. Sprayers
5. electric, gasoline

6. Soil sterilizers

Part Three: Short Answer

1. Power tool maintenance suggestions include:
   a. clean tools
   b. check electric cords and guards/shields
   c. operate gasoline powered tools in a well ventilated areas
   d. check the condition and tightness of chains and belts
   e. store in a clean dry place
   f. sharpen cutting edges
   g. store tools in the same place each time
2. Grinder safety rules include:
   a. inspect for grinding wheel cracks and chips
   b. use face shields or goggles
   c. wear leather gloves
   d. use vice grips to hold small items
   e. hold large items firmly when grinding or use a portable grinder
   f. do not use the side of the grinding wheel
   g. keep the tool rest adjusted to within 1/8 of a inch from the wheel
   h. use water to prevent overheating when sharpening

Sample Test Name _____

Test

Lesson C6–2: Using Power Tools

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. Aerator
b. Chain saw
c. Dethatcher
d. Grass edger
e. Leaf blower
f. Power hedge shear
g. Reel mower
h. Rotary mower
i. Rototiller
j. Shredder

_____ 1. Tool that cuts grass with a blade that turns in a circle.

_____ 2. Tool used to rapidly remove grass clippings from a sidewalk.

_____ 3. Tool used to cut large limbs during tree pruning.

_____ 4. Tool used to loosen soil in seedbed preparation.

_____ 5. Tool used to prune small shrubs and hedges.

_____ 6. Tool used to make wood chip mulch out of branches.

_____ 7. Tool used to cut grass with a scissors type action on golf course greens.

_____ 8. Tool used to loosen dead grass and grass clippings for removal.

_____ 9. Tool used on compacted soil to open up the soil allowing more air to the grass roots.

_____ 10. Tool used to produce a straight line of grass next to a sidewalk or driveway.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. Mowers are push mowers, _____mowers, or _____mowers.
2. Lawns that are heavily fertilized and not bagged will probably need to be _____.
3. _____ are used to apply seed and fertilizer.
4. _____ are used to spray liquid pesticides.

5. Power tools are generally _____ powered or _____ powered.
6. _____ are used to kill diseases, organisms by heating at 180°F for 30 minutes.

Part Three: Short Answer

Instructions. Provide information to answer the following questions.

1. Give five power tool maintenance suggestions:

2. Give five grinder safety rules:

TM: C6–2A

EXAMPLES OF TURF MAINTENANCE POWER TOOLS

Rotary Mower

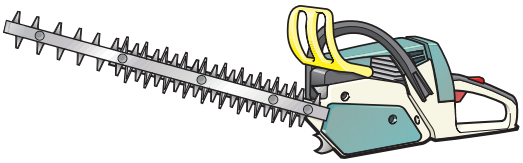
Reel mower

Aerator

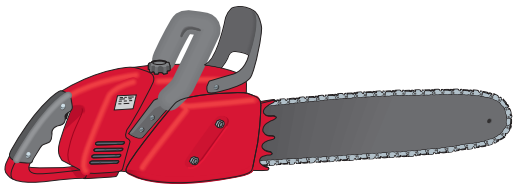
Power Sprayer

TM: C6–2B

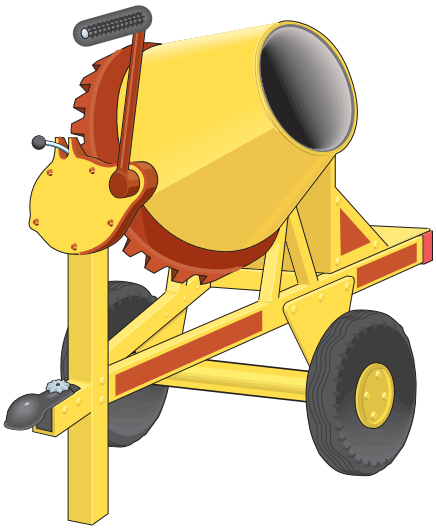
EXAMPLES OF LANDSCAPE INSTALLATION AND MAINTENANCE POWER TOOLS



Power Hedge Shears



Chain Saw



Concrete Mixer

(Courtesy, Interstate Publishers, Inc.)

TM: C6–2C

POWER GRINDER SAFETY PRECAUTIONS

1. Inspect the grinding wheel for cracks or chips before it is used.
2. Always use a face shield or goggles when grinding.
3. Protect your hands with leather gloves.
4. Hold small items with vise grips or clamp them in a vise and use a portable grinder.
5. Hold larger items firmly in leather gloved hands.
6. Do not use the side of the grinding wheel.
7. Be sure the tool rest is slightly above the center of the wheel.
8. Adjust the tool rest to within 1/8 inch of the wheel.
9. Adjust the tool rest to the angle of the item being ground.
10. Prevent overheating by periodically dipping the items being ground in water.

 Name_____

Lab Sheet

Horticulture Power Tool Inspection and Maintenance

Materials:

Power tool
Owner's manual
Maintenance supplies listed in the manual
Solvent and shop rags

Procedure:

1. Clean the power tool.
2. Check the power tool for leaks, cracks, and other defects.
3. Check the attachment cord condition of electrical tools.
4. Check for proper operation of all guards and safety shields.
5. Check all chains and/or belts for condition and tightness.
6. Rotate pulleys, cogs, and gears to check alignment and bearings.
7. Perform any preventative maintenance recommended by the owner's manual.
8. Record the date and all service jobs completed.

LS: C6–2B Name _____

Lab Sheet

Sharpening a Rotary Mower Blade

Materials:

Angle gauge
Rotary lawnmower blade that needs sharpening
Grinder
Blade balancer
Safety glasses or a face shield

Procedure:

1. Check the cutting angle of the blade with an angle gauge. When sharpening the blade maintain the original angle.

Stationary Grinder

2. View TM: C6–2C Power Grinder Safety Precautions prior to sharpening the blade.
3. Put on your safety glasses and leather gloves.
4. Adjust the tool rest to the angle of the blade.
5. Hold the blade securely and move the blade back and forth across the grinding wheel until any nicks are gone and the first edge is sharp.
6. Rotate the blade and sharpen the other end.
7. Set the blade on the blade balancer. If one end is heavier than the other, re-grind the heavy end until the blade balances.

Portable Grinder

1. Put on safety glasses and leather gloves.
2. Secure the blade in a shop vise.
3. Hold the portable grinder in both hands and grind the blade maintaining the original angle.
4. Rotate the blade, re-clamp in the vise, and grind the other end.
5. Set the blade on the blade balancer. If one end is heavier than the other re-grind the heavy end until the blade balances.

Caution: Avoid overheating the blade while grinding by dipping it periodically in water.